ACCESSION #: 9604160449
LICENSEE EVENT REPORT (LER)

FACILITY NAME: WATTS BAR NUCLEAR PLANT - UNIT 1 PAGE: 1 OF 13

DOCKET NUMBER: 05000390

TITLE: Manual Reactor Trip and Related Engineered Safety Feature Actuation
EVENT DATE: 03/13/96 LER #: 96-009-00 REPORT DATE: 04/10/96

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 049

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION:
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: Rickey Stockton, Compliance TELEPHONE: (423) 365-1818
Licensing Engineer

COMPONENT FAILURE DESCRIPTION:
CAUSE: D SYSTEM: SD COMPONENT: ISV MANUFACTURER: H037
REPORTABLE NPRDS: N

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

On March 13, 1996, with Unit 1 in Mode 1 at approximately 49 percent reactor power and generator load at 480 MWe, TVA operators initiated a manual turbine trip followed by a manual reactor trip. The manual turbine trip resulted from the failure of the main condenser to maintain adequate vacuum to sustain turbine operation. The cause of loss of vacuum is attributed to the isolation of condensate flow to the main feedwater pump turbine (MFPT) condenser 1B.

Prior to the event on February 29, 1996, condensate bypass supply and discharge valves had been closed during maintenance activities on the MFPT 1B. When power was increased on March 13, 1996, the inlet isolation valves automatically closed which completely isolated condensate flow to MFPT 1B. With condensate isolated, the gland seal steam was no longer being condensed and was pulled into the suction of the vacuum pumps. The vacuum pumps were then unable to remove non-condensables which resulted

in loss of vacuum to the main condenser.

The manual reactor trip resulted from loss of feedwater to the steam generators when the number 2 heaters isolated and severed the suction source to the standby feedwater pump. All equipment functioned as designed except the MFPT 1B condenser outlet valve which did not close when feed flow exceeded 40 percent. All control rods fully inserted and the plant was stabilized in Mode 3.

Corrective actions include operating procedure revisions, verification of proper operation of automatic MFPT condenser flow switch and setpoint isolation logic, and a design modification to provide a direct flow path from the MFPT condensers to the main condenser.

END OF ABSTRACT

I. PLANT CONDITIONS

At the time of the event, TVA operators were maintaining the plant at steady state with reactor power at 49 percent and generator (Energy Industry Identification System (EIIS) Code TG) load at approximately 480 MWe. Hotwell pumps 1A and 1B (EIIS Code SD/P), condensate booster pumps 1A and 1C (EIIS Code SD/P), and the main feedwater pump 1A (EIIS Code SJ/P) were in service supplying feedwater to the steam generators (EIIS Code SG).

II. DESCRIPTION OF EVENT

A. Event

Prior to this event, on February 29, 1996, the condensate bypass supply and discharge valves (EIIS Code SG/V), 1-BYV-2-749 and -776 to MFPT condenser 1B (EIIS Code SG/COND), were left in the closed position during a rupture disc (EIIS Code RPD) replacement activity.

As power was increased on March 13, 1996, between 0900 and 1830 EST, automatic isolation of condensate flow to MFPT 1B occurred resulting in the loss of condensing capability for MFPT 1B condenser (MFP 1B was already tripped, with total feedwater flow greater than 40 percent). TVA subsequently determined that steam had accumulated in MFPT 1B condenser/tank (EIIS Code SD/COND/TK) and was being drawn into the suction of condenser vacuum pumps (EIIS Code SH/P). At 1830 EST, condenser vacuum pump exhaust flow indicated zero. Shortly thereafter, a momentary vibration spike on the turbine occurred due to changing back pressure conditions in main condenser (EIIS Code COND).

At 1836 EST, the MFPT condenser drain tank "Hi/Lo" alarm (EIIS Code SD/TK/LA) sounded. This was an indication of MFPT condensate drain tank (EIIS Code SD/TK) pressurization with steam, causing a level increase in MFPT 1A condenser drain tank (EIIS Code SG/COND/TK) and rapid oscillations of the MFPT condenser drain tank bypass level control valve. However, the condenser vacuum pump flow later recovered but became erratic. The condenser vacuum low alarm sounded at 1846 EST. As a result, the operators entered procedure AOI-11, "Loss of Condenser Vacuum."

At 1850 EST, de-icing valves (EIIS Code V) were manually opened in an attempt to improve cooling tower efficiency. These valves were closed earlier in response to low outside air temperatures and icing in the cooling tower. The operators then started a third condenser vacuum pump and a third condenser circulating water (CCW) pump (EIIS P). CCW outlet temperature increased and divergence was noticed between west and east tube bundles. This was an indication of non-condensable gas accumulation in both tube bundles (more in west tube bundle) reducing effective heat transfer surface area. Condensate subcooling margin relative to condenser vacuum decreased as condensate temperature increased.

At 1908 EST, operations personnel began to decrease turbine load and reactor power. In the following minutes, alarms for low MFPT B condensate vacuum (EIIS Code SH/PA) and the number 3 heater drain tank bypass to condenser open were received. The low condensate vacuum was due to steam accumulation from sealing steam and high and low pressure stop valve gland exhaust steam. At 1924 EST, operations personnel stopped turbine load reduction at 360 MWe due to improving condenser vacuum. However, the operators later began load reduction again at an increased rate of 5 percent per minute due to worsening condenser vacuum. The operators also performed the swap-over from main feedwater regulator valves (EIIS Code SJ/FCV) to bypass regulator valves (EIIS Code SJ/FCV) with MFPT 1A speed control in manual. The unit operator initiated a manual main turbine trip at 1945 EST. Subsequently, condenser vacuum exhaust flow went to zero for about 20 to 30 minutes.

At 1949 EST, steam generator number 1 power operated relief valve (PORV) (EIIS Code SB/RV) opened and closed at approximately 1955 EST. The unit operator shifted steam dumps (EIIS Code SB/V) to pressure mode. The number 1 feedwater heater safety valve opened on the feedwater side. The lower load increased MFPT 1A suction pressure resulting in MFPT 1A discharge pressure increase with speed control in manual. As a result, the operators took action to lower MFPT speed and discharge pressure to below the relief setpoints. The operators also started boration of the reactor.

At 1957 EST, the unit operator started the standby main feedwater pump. At this point, the number 2 feedwater heater string (A, B, C) high level alarm (EIIS Code SJ/LA) was received.

At 2000 EST, operators reset MFPT 1B and tripped MFPT 1A. Shortly thereafter, isolation of the intermediate numbers 2-4 feedwater heater strings occurred due to number 2 feedwater heater high level. Low net positive suction head (NPSH) for standby main feedwater pump then occurred due to heater string isolation. At 2004 EST, low steam generator level occurred on all four steam generators (SGs). At this point, WBN Unit 1 was in Mode 2 with reactor power at approximately 2 percent. The unit operator then initiated a manual reactor trip which resulted in an auxiliary feedwater (EIIS Code BA) automatic start.

B. Inoperable Structures, Components, or Systems that Contributed to the Event

Subsequent to this event, condensate bypass supply and discharge valves, 1-BYV-2-749 and -776, were found to be closed rather than the normally open position.

C. Dates and Approximate Times of Major Occurrences

TIME EVENT

2-29-96 Condensate Bypass supply/discharge valves (1-BYV-2-749, -776) to MFPT 1B condenser left in closed position during rupture disk replacement.

3-13-96 As power was increased, automatic isolation of
(between condensate flow to MFPT 1B condenser (Main feedwater
0900 and pump 1B was already tripped, with total feedwater
1830) flow greater than 40 percent) resulted in loss of all
condensing capability for MFPT 1B condenser.

1828 Steam accumulated in MFPT 1B condenser/tank and discharged to suction of condenser vacuum pumps.

1830 Condenser vacuum pump exhaust flow indicates zero.

1834 Momentary vibration spike on turbine due to changing back pressure conditions in main condenser.

1836 MFPT Condenser Drain Tank "Hi/Lo" Alarm, indication of pressurization of MFPT condenser drain tank with steam causing level increase in 1A MFPT condenser and rapid oscillations of the MFPT condenser drain tank bypass level control valve.

1845 Condenser vacuum pump exhaust flow recovers - becomes erratic.

1846 Condenser Vacuum Low Alarm.

1849 Entered AOI-11, "Loss of Condenser Vacuum."

1850 De-icing valves manually opened (normal position), valves were closed earlier in response to low outside air temperatures and icing in cooling tower.

1852 Started third Condenser Vacuum Pump.
Started third CCW Pump.

CCW outlet temperature increase and divergence noticed, West is greater than East, indication of non-condensable gas accumulation in both tube bundles, more in West tube bundle, reducing effective heat transfer surface area. Condensate subcooling margin relative to condenser vacuum decreased as condensate temperature increased.

1908 Operations begins decreasing turbine load and reactor power.

1909 Alarm received - MFPT B Condenser Vacuum low due to steam accumulation from sealing steam, high pressure and low pressure stop valve gland exhaust steam.

1912 Alarm received - number 3 Heater Drain Tank Bypass to condenser open.

1924 Stopped load reduction at 360 MWe due to improving condenser vacuum.

1941 Operations increases load reduction rate to 5 percent/minute due to worsening condenser vacuum. Operations performs swap-over from main feedwater regulator valves to bypass regulator valves (Forward Flush MODE, per procedure). MFPT 1A speed control in manual.

1945 Main turbine trip (manual) - (Shortly, thereafter, condenser vacuum exhaust flow went to zero for about 20 to 30 minutes.)

1949 Steam generator 1 power operated relief valve opens and closes at about 19:55. Unit operator shifted steam dumps to pressure mode.

1950 Number 1 feedwater heater safety valve (feedwater side) opens. Lower load increased MFPT 1A suction pressure resulting in MFPT 1A discharge pressure increase with speed control in manual. Started boration of the reactor.

1954 Unit operator stopped Condensate Booster Pumps

1955 Alarm received - MFPT 1A pump vibration; clears at 19:55:50, high vibration due to short duration operation on miniflow after securing condensate booster pumps.

1957 Unit operator started standby main feedwater pump.

1957 Alarm received - number 2 Feedwater Heater String (A, B, C) - High level

2000 MFPT 1B reset in preparation for tripping MFPT 1A.

MFPT 1A tripped.

2002 Intermediate (number 2-4) Feedwater Heater Strings isolate due to number 2 Feedwater Heater high level.

2003 MFP NPSH Low due to heater string isolation

2004 Low SG Level on all four SGs due to loss of flow through standby MFP.

2004 Mode 2, reactor power - approximately 2 percent

2005 Manual reactor trip (E-0). Auxiliary feedwater automatically starts

D. Other Systems or Secondary Functions Affected

Atmospheric steam generator power operated relief valves (PORVs) actuated as designed. In addition, the feedwater side safety valves on the number 1 heaters actuated following the turbine trip.

E. Method of Discovery

Annunciation and indication in the Main Control Room.

F. Operator Actions

The operating crew entered procedure AOI-11, "Loss of Condenser Vacuum," started an additional condenser vacuum pump and CCW pump. They then began reducing turbine load and reactor power in response to increasing main condenser back pressure.

The operating crew manually tripped the main turbine and entered procedure AOI-17, "Turbine Trip," and manually tripped the reactor in response to loss of feedwater flow due to heater string isolation. The crew entered procedure E-O, "Reactor Trip or Safety Injection," and completed immediate operator actions before transition to procedure ES-0.I, "Reactor Trip Response." The plant was stabilized in Mode 3.

G. Automatic and Manual Safety System Response

When the reactor was manually tripped, an automatic start of auxiliary feedwater resulted. This start was as expected as a result of a manual reactor trip.

III. CAUSE OF EVENT

A. Immediate Cause

The immediate cause of this event was identified as a loss of condenser vacuum.

B. Root Cause

Turbine Trip

The root cause of this event was determined to be improper alignment of valves 1-BYV-2-749 and -776 due to an inadequate procedure. Contributing to this condition was that the main feed pump turbine condenser vacuum exhausts directly to the condenser vacuum pumps. This condition permitted steam vapor from the MFPT condenser to adversely effect vacuum pump operation and main condenser vacuum. In addition, moisture carryover also impacts vacuum pump suction strainer differential pressure (DP) instrumentation function.

Reactor Trip

Number 2-4 feedwater heater strings automatically isolated due to high shell level, thus blocking the suction path to standby main feed pump. This condition caused a loss of feedwater to the steam generators which led operators to initiate the manual reactor trip. Procedural guidance does not account for the necessity to expedite removing the heaters from service while at low power.

Contributing to this condition was that no automatic design features existed to open an alternate drain path back to the main condenser from the number 2 heaters before a hi-hi number 2 heater level condition initiates an intermediate feedwater heater string isolation.

Feedwater Relief Discharge

The lifting of the number 1 feedwater heater safety valves on the feedwater side resulted from too high a feedwater pump discharge head at low flow conditions.

IV. ANALYSIS OF EVENT - ASSESSMENT OF SAFETY CONSEQUENCES

A. Evaluation of Plant Systems/Components

Reactor Coolant System/Reactor Core Response

The reactor core responded as expected to the rapid decrease in turbine power and subsequent turbine trip. Rod control (EIIS Code AA) was in manual and the operator at the controls maintained the power mismatch (Tavg-Tref) to within acceptable limits. Some overshoot on system temperature was experienced. This can be contributed to the minimal decay heat in the core. Reactor power was initially stabilized between 6-9 percent and then reduced to within Mode 2 limits. The reactor was manually tripped due to the loss of feedwater when the intermediate feedwater heaters isolated. All rods fully inserted into the core and flux decreased as expected.

Steam Generator Power Operated Relief Valves/Steam Dump

After the turbine trip had occurred, the response procedure directed the crew to place the steam dumps into steam pressure mode. The system was recovering from the cooldown overshoot in the reactor coolant system (RCS) and there was no demand on the dumps. The steam generator PORVs were the heat removal path for the RCS, and the PORVs functioned as designed when steam pressure reached the relief setpoint.

Auxiliary Feedwater

The auxiliary feedwater system (EIIS Code BA) started following the reactor trip to supply water to the steam generators. The turbine driven pump (EIIS Code BA/P) started and received suction from the condensate storage tank (KA/TK). Auxiliary feedwater injection from the turbine driven pump was secured in favor of the motor driven pumps. No anomalies were noted in the actions performed or the system behavior. Auxiliary feedwater performed as expected.

Condensate/Feedwater Systems

Prior to the event, the condensate/feedwater system was partially aligned for full power operation. Two hotwell pumps and two condensate booster pumps were in-service supplying suction pressure to the main feedwater pump 1A. Number 7 heater drain tank pump was in-service and pumping forward. All feedwater heaters were in-service. Number 3 heater drain pump was in-service on recirculation.

Due to the power and flow decrease, condensate and feedwater pump discharge pressures increased and system resistance decreased. Upon transfer from the main feed regulator valves to bypass feedwater regulator valves with main turbine trip and MFPT 1A speed constant in manual speed control, both MFPT 1A suction pressure and steam generator pressure increased resulting in a more significant decrease in feedwater flow and an increase in feedwater header pressure. Feedwater pump discharge pressure increased and reached the setpoint for the number 1 heater relief valves.

After the turbine trip, the extraction steam to the heaters was isolated by the non-return valves. Low pressure moisture separator reheater (MSR) (EIIS Code RHTR) operating vents and drains remain open to drain steam and condensate from the MSR low pressure reheater drain tanks (EIIS Code RHTR/TK). In addition, elevation difference between the number 3 heater drain tank to the number 2 feedwater heaters allowed water to drain from the number 3 heater drain tanks to the number 2 feedwater heater as condensate depressurizes the number 2 heater shells. As a result, water level continued to rise in the number 2 heaters until the hi-level setpoints were reached. Isolation of the three heater strings eliminated the suction path for the standby main feedwater pump.

The response of the condensate/feedwater system (EIIS Code SD/SJ) was as designed because of the state of the valving in the extraction steam system, the prior levels of the heaters, the drainback of water in the connecting piping, and elevation/pressure changes due to system line-ups.

MFPT Condenser and Vacuum Pumps

At the time of this event, the MFP 1A was in operation, and MFP 1B was on turning gear with steam seals in-service. Isolation valve 1-ISV-2-627 in the air removal line from the MFPT 1A condenser was in a throttled position in accordance with system operating instruction, SOI-2 and 3.01, "Condensate and

Feedwater." Isolation valve 1-ISV-2-626 for the air removal line from the MFPT 1B condenser was in the fully open position. Condensate flow was being supplied to the MFPT 1A condenser through valve 1-FCV-2-210.

The bypass valve 1-BYV-2-747 around 1-FCV-2-210 was closed due to a procedure problem with SOI-2 and 3.01 (bypass normally open). On March 13, 1996, during power escalation, the setpoint of greater than 40 percent feedwater flow and MFP 1B tripped was reached to close the condensate supply valve to the MFPT 1B condenser. This condition resulted in the isolation of condensate flow to the condenser since its inlet bypass valve (1-BYV-2-749) was incorrectly closed.

The purpose of the bypass valves is to allow some condensate flow to cool the condenser and condense steam from the MFPT steam seals and high and low pressure stop valve gland

exhaust. Condenser vacuum pumps 1A and 1B were in operation removing noncondensables from the main condenser and both MFPT condensers. Discharge flow rate of the vacuum pumps was approximately 40 standard cubic feet per minute (SCFM) and had been consistent over the previous several days. Since condensate was isolated to MFPT 1B condenser, sealing steam was building up in the turbine and condenser housing and was being drawn into the vacuum pumps.

At approximately 1830 EST, the steam build-up in the MFPT 1B condenser caused steam binding of condenser vacuum pumps 1A and 1B. The discharge flow rate of the pumps dropped to near zero. Since non-condensables were no longer being removed by the vacuum pumps, the main condenser backpressure began to increase bringing in the alarm for low condenser vacuum at approximately 1845 EST in the main control room. Condenser vacuum pump 1C was started but since the three vacuum pumps shared the same suction piping, main condenser backpressure continued to increase.

As a result of the loss of condenser vacuum, operation personnel reduced unit load, and subsequently removed the turbine from service. During this time, temperatures increased in both MFPT 1A and 1B condensers but since MFPT 1A condenser had condensate flow, its increase was much less than condenser 1B which eventually exceeded 200 degrees F.

After the turbine and reactor were tripped, an inspection of the vacuum pumps identified water in the discharge line which indicated that steam was condensing in the vacuum pump piping. On March 14, 1996, TVA personnel tested the three condenser vacuum pumps and found that they functioned properly.

Condenser Circulating Water and Cooling Tower

The CCW system consists of 4 circulating water pumps supplying water to 2 water boxes (east and west) of the main condenser. Each water box supplies a tube bundle for condensing of steam in the condenser housing.

At the time of the event, two circulating water pumps were in operation supplying 74 degrees F water to the water box. Water flowed through the tubes condensing steam and exited at a temperature of 106 degrees F. As condenser vacuum decreased CCW outlet water temperature began to increase due to accumulation of non-condensable gases in the condenser tube bundles below the vacuum headers. Operators started the third available CCW pump (the fourth pump was inoperable). This action did have a temporary effect of stabilizing the condenser vacuum decrease.

During the event, the operators were attentive to CCW impact on condenser performance and vacuum. Subsequent to starting the third CCW pump, the operators observed equal CCW pressure differential across the tube bundles, opening of the cooling tower de-icing valves, and observed condenser CCW discharge temperatures. These actions were taken to determine if flow blockage in the water box, pump degradation, or other factors were the cause of the condenser vacuum decrease. As the event progressed, it was observed that

the west side of the condensers outlet CCW temperature was 4 to 12 degrees higher than the east. This was determined to be caused by an imbalance in non-condensables in each tube bundle.

B. Evaluation of Personnel Performance

Operations personnel responded appropriately for the duration of the event. The operating crew recognized the increasing back pressure in the main condenser and took the appropriate actions to reduce back pressure in accordance with AOI-11, "Loss of Condenser Vacuum." These actions included starting additional CCW and condenser vacuum pumps followed by a reduction of turbine load and reactor power. Since the actions taken did not result in adequately reducing back pressure, the operating crew manually tripped the main turbine due to the high condenser back pressure.

The operating crew entered AOI-17, "Turbine Trip," and took actions to stabilize the plant. The crew then recognized that feedwater flow had been lost and responded by manually tripping the reactor. Procedure E-O, "Reactor Trip or Safety Injection," was implemented, with transition made to ES-0.1, "Reactor Trip Response." Actions required by ES-0.1 were taken and upon completion of this procedure the crew transitioned to GO-2, "Reactor Startup."

Prior to the manual reactor trip the intermediate feedwater heater string isolated due to high level resulting in the loss of feedwater. AOI-17, "Turbine Trip," has been revised to provide the operator with specific guidance to isolate extraction steam to the number 2 heaters and open the number 3 heater drain tank bypass to the condenser.

Operating procedures have been evaluated to determine the most expeditious method of controlling feedwater and condensate pump operation during a unit power reduction to ensure the inlet relief valves to the number 1 heaters do not lift.

C. Safety Significance

The event can be divided into two major phases for analysis of safety significance. The first portion of the event can be characterized as a secondary plant event. The event proceeded from the slow loss of condenser vacuum and associated operator actions to system manipulations to arrest vacuum loss and maintain secondary side performance. Given the valve alignments, procedure directions, and equipment performance this event progressed as expected. Actions were taken to restore condenser vacuum including manipulations of the condenser circulating water system (i.e., opening de-icing valves; starting a third condenser circulating water pump; verifying condenser pressure), manipulations of the vacuum pump system by starting a third pump, observation of main feedwater pump turbine condenser drain tank performance, and reducing secondary side load and reactor power to reduce main condenser load.

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The personnel actions and performance of systems were conservative and safe. The turbine was tripped prior to any automatic trips and after considerable effort to regain stability at operating conditions. This portion of the event is non-safety significant. The event progressed slowly allowing for operator actions and attempts for restoration.

The second phase of the event progresses from the turbine trip to the reactor trip. During this portion of the event, the feedwater heaters were filling with water and eventually resulted in feedwater isolation due to high levels. Relief of the number 1 heater condensate was expected as feedwater pressure increased during load reduction and manipulations of the main, feedwater pump turbine speed control. The isolation of the feedwater input to the standby feed pump resulted in a loss of feedwater to the steam generators. The reactor was conservatively tripped from a low power condition to protect heat removal capability. During the progression of this portion of the event, the reactor power had been reduced in an effort to avoid the reactor trip and maintain low power or standby conditions. The loss of feedwater flow through the heaters precluded this objective. No abnormal performance was noted. The auxiliary feedwater started and maintained steam generator level. No safety significance is attributed to this portion of the event.

V. CORRECTIVE ACTIONS

A. Immediate Corrective Actions

The immediate corrective actions for this event are described under the operator actions section of this report.

B. Corrective Actions to Prevent Recurrence

Turbine Trio Corrective Action

1. TVA has added steps to SOI-2 and 3.01 to ensure that, during MFP startup and short cycle operations, MFPT condenser inlet bypass valves are open.

2. TVA has verified proper operation of flow switch logic and

setpoint that automatically isolates a MFPT condenser for a tripped MFPT when power is greater than 40 percent.

3. TVA has issued design change notice R38735 to provide a vacuum flow path from the MFPT condensers directly to the main condenser to prevent steam binding of the condenser vacuum pumps. TVA will implement this modification to install this MFPT condenser tie to main condenser prior to commercial operation.

4. TVA has corrected wiring to temperature element, 1-TE-2-244, located on the inlet of MFPT 1B condenser. This temperature element was found to be wired incorrectly.

5. TVA has issued a night order discussing lessons learned on the importance of throttling the flow of non-condensables from the MFPT condenser to the suction of the vacuum pumps.

Reactor Trip Corrective Action

1. TVA has reviewed and revised procedures to mitigate the isolation of the number 2 heaters when not warranted.

VI. ADDITIONAL INFORMATION

A. Failed Components

1. Safety Train Inoperability

There were no failures that rendered a train or safety system inoperable.

2. Component/System Failure Information

a. Method of Discovery of Each Component or System Failure:

Loss of Condenser Vacuum - The root cause for this failure was determined by thorough analysis of the event data and through inspection of the equipment. The investigation team used Kepner-Tregoe (KT) analysis techniques to determine the root cause of the event.

b. Failure Mode, Mechanism, and Effect of Each Failed Component:

The loss of condenser vacuum was determined to be improper alignment of valves 1-BYV-2-749 and -776 due to an inadequate procedure which led to the conditions described in this LER.

c. Root Cause of Failure:

Defective Procedure - Valves 1-BYV-2-749 and -776 were closed during a maintenance activity. However, procedure SOI-2 and 3.01 did not ensure that these valves were open prior to system operation.

d. For Failed Components With Multiple Functions, List of Systems or Secondary Functions Affected:

See previous sections for discussion of systems affected.

e. Manufacturer and Model Number of Each Failed Component:

Isolation valves 1-BYV-2-749 and -776 - Hancock MFG Co., Inc. Model Number 5525W-1

B. Previous Similar Events

For WBN Unit 1, a manual turbine trip and a manual reactor trip occurred on February 19, 1996 (Licensee Event Report 390/96004). The cause of the March 13, 1996, trips were determined to be different from the cause of the February 19, 1996 trips.

VII. COMMITMENTS

The actions taken in response to this event are tabulated in Section V, Corrective Actions. These actions are complete except for the implementation of DCN R38735 which will be completed prior to commercial operation.

TVA
Tennessee Valley Authority, Post Office Box 2000
Spring City, Tennessee 37381

APR 11 1996

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555

Gentlemen:

In the Matter of) Docket Nos. 50-390
Tennessee Valley Authority)

WATTS BAR NUCLEAR PLANT (WBN) - UNIT 1 FACILITY OPERATING LICENSE NPF-90
- LICENSEE EVENT REPORT (LER) 50-390/96009 - MANUAL REACTOR TRIP AND
RELATED ENGINEERED SAFETY FEATURE (ESF) ACTUATION

The purpose of this letter is to provide the subject LER. The enclosed report provides details regarding the manual reactor trip and related ESF actuation which occurred on March 13, 1996, after the initiation of a manual reactor trip. Submittal of this report is in accordance with 10 CFR 50.73(a)(2)(iv).

If you should have any questions, please contact P. L. Pace at (423) 365-1824.

Sincerely,

D. V. Kehoe
Nuclear Assurance
and Licensing Manager

Enclosure
cc: See page 2

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ENCLOSURE

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